Laser distance sensors

Contactless accuracy: alternative to 3D measuring machines

3D measuring machines are often indispensable in quality assurance, especially when coordinate values (x, y and z) are to be recorded automatically and with high repeat accuracy from workpieces via diffuse reflection sensors and transferred to a PC for further processing, which then calculates and saves the measurement results. However, things get complicated when a component to be tested is so unstable that reliable measurement data cannot be determined via a diffuse reflection sensor. A new development now makes this possible - contactless, efficient and with high precision.

"We basically manufacture slide gauges for 3D parts," says Uwe Schneider, Managing Director of Modellbau SCHNEIDER GmbH based in Olpe am Biggesee. The modesty certainly honors the master model maker in the field of foundry technology. Nevertheless, in recent years his company has specialized very successfully in the development and manufacture of test gauges and measuring devices. In addition, the company develops and manufactures foundry models, functional models, designer models, prototypes and welding fixtures on a production area of over 800 square meters, whereby an extremely wide range of materials are processed on modern five-axis milling machines with a high level of vertical integration.

Valuable support in the field of sensor technology

With such a long "wish list", it is not surprising that Uwe Schneider and his employees had to tinker for around a year before they were finally able to present a market-ready system. The master model maker received significant support from ipf electronic, the sensor specialist from Lüdenscheid. Uwe Schneider comments: "As a master model maker, I certainly have knowledge of the potential applications of sensors, but we still needed advice and help in this area. The know-how and experience of ipf electronic was therefore very valuable to us during the development process. I particularly appreciated the company's ability to think its way into completely new applications. Among other things, this makes it possible to quickly delimit the possibilities of the sensor technology in question. In addition, ipf electronic was always there to help and advise me throughout the entire development phase."

Solution required for testing unstable components

Modellbau SCHNEIDER's customers come primarily from the automotive industry, both manufacturers and suppliers. And it was precisely from this sector that the company was inspired to develop a completely new type of measuring system. "An automotive supplier needed a solution with which a component could be tested very effectively and therefore quickly at various measuring points. However, as the component was very unstable, a tactile system was out of the question. The test therefore had to be contactless and the measurement data had to be transferred to a PC for evaluation and documentation," recalls Uwe Schneider, adding: "The system also had to be able to be operated by anyone and provide instant measurement results at the touch of a button."

Success through persistence

When you develop something new, you also have to accept setbacks. The development of the new measuring system was no different. The first approach with integrated dial gauges did not lead to the desired goal "The component to be tested was so unstable that the values of the individual measuring points changed with different measurements, and incorrect operation of the system by a worker could not be ruled out. The use of inductive sensors also did not meet our requirements. In addition, this approach seemed too instable for a system that was supposed to work reliably via a long period of time. Ultimately, ipf electronic also recommended that we use laser distance sensors, which finally helped us achieve a breakthrough at the end of 2011, so that we were able to present the first system under the registered brand name MS-Lasermess- at the beginning of 2012."

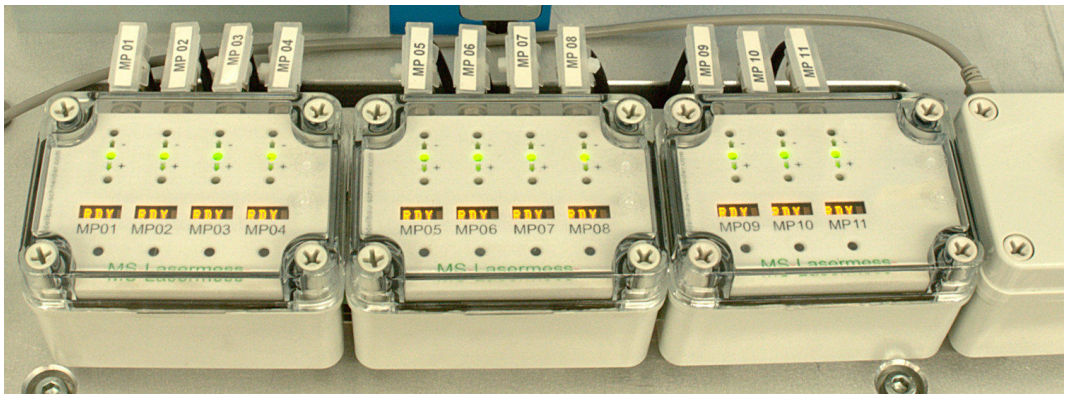
Modular, contactless, accurate, fast

The MS laser measuring system is a modular measuring system that is integrated into a test gauge. The system measures the approval maximum and minimum dimensions of a test specimen at one or more measuring points with an accuracy of up to 0.01 mm in a contactless manner. The 1800 series laser distance sensors from ipf electronic are used here, which are positioned on holders around the component to be tested depending on customer requirements or the number of measuring points. The sensors have a measuring range of up to 120 mm and, with the integrated microcontrollers, provide a precise output signal proportional to the measured distance.

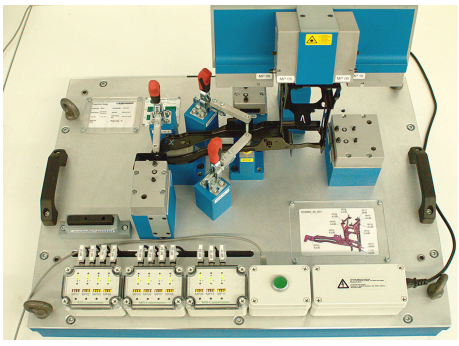
The signals are transmitted and output to measuring boxes specially developed by Modellbau SCHNEIDER, whereby up to four laser distance sensors can be connected to each measuring box.

Test results instantly visible

The test results are visualized for the operator of the system via the measuring boxes in a variety of ways. Integrated green and red LEDs immediately show whether a measured value is within or outside the programmed limit values. In addition, via a diode display with arrows, the operator can see instantaneously whether the deviations of the measurements are moving upwards or downwards in relation to the limit values. A further display, also integrated into the measuring box, also shows the results for the individual measuring points as a numerical value.



"Insert, tension, press the button, done"



The other advantages of MS laser measurement systems are their extremely simple operation, speed and modularity. In contrast to 3D measuring machines, no qualifications are required to handle this contactless measuring system. The component is simply placed in the clamping device provided for this purpose and fixed in place. The test process is started at the touch of a button and the results are transferred to a PC for evaluation and storage in a freely selectable QA software. "Insert, clamp, press the button, done," is how Uwe Schneider sums up the minimal procedure and at the same time points out: "For a component with eleven measuring points, a 3D measuring machine needs an estimated 30 minutes to determine all the values. With MS-Lasermess, the same test only takes around 20 seconds, and then I have already saved the measurement results on a PC. Not to mention the fact that very unstable components in particular cannot be tested at all with 3D measuring machines."

Flexibly open-ended

In terms of modularity, the new development is basically open at the top. In line with the number of measuring points required, MS Laser Measurement can be flexibly expanded with additional measuring boxes and distance laser sensors. The only limiting factors can be the size of the test gauge and perhaps also certain physical limits of a specific component. "As far as the number of measuring boxes is concerned, however, I have not yet identified an upper limit. We are currently developing a test gauge with 24 measuring points for a customer," says Uwe Schneider. According to the Managing Director, the integration of further query options in MS-Lasermess is also unproblematic. "For example, a customer recently wanted to be able to inquire about the temperature of the gauge and the component in addition to the component inspection. We were also able to implement this solution with the help of sensors from ipf electronic, among others."